FDI, LABOUR MOBILITY AND WAGES

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Abstract

There is a multitude of empirical research attempting to measure the effects of foreign direct investment, including the extent of spillovers from foreign owned to domestic firms. However, the mechanisms through which these spillovers occur have not received as much attention. One of the potential channels for spillovers of technological, marketing or managerial knowledge from foreign owned to purely domestic firms is labour mobility. Workers may benefit from such a spillover process if they manage to appropriate part of the return to the knowledge of the foreign owned firm. This paper uses Finnish linked employer-employee panel data to analyse the extent to which employees benefit from knowledge they acquire in foreign owned firms. The possibility that employees may pay for the accumulation of this knowledge, as well as the potential for "reverse spillovers" i.e. knowledge diffusion from domestic to foreign owned firms are also considered. The estimates indicate that highly educated employees earn a return to prior experience in a foreign owned firm, over and above the return to other previous experience. These workers do not appear to pay for the accumulation of knowledge in the form of lower wages. The results do not indicate that foreign owned firms pay a premium for knowledge that workers bring with them from domestic firms.

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1   Introduction

Spillover effects from foreign owned to domestic firms have been cited as one of the reasons behind recent policies designed to attract foreign direct investment (FDI). Foreign owned firms are claimed to have superior technological, marketing or managerial knowledge that may spill over to purely domestic firms. Potential channels for these spillovers include i) backward and forward linkages between foreign owned and domestic firms, ii) demonstration effects and iii) labour mobility. (Blomström and Kokko, 1998). Although there is a multitude of empirical research attempting to verify the magnitude of benefits of FDI, including the extent of spillovers from foreign to domestic firms, the mechanisms through which these spillovers occur have not received as much attention.

Spillovers from foreign owned to domestic firms have mostly been studied by examining the effect of the presence of a multinational company in an industry on the productivity of domestic firms. Most studies do not explicitly study the channels for these spillovers, and the evidence on the productivity effects of the presence of a multinational company is not conclusive (Barba Navaretti and Venables, 2004). The studies that do consider the mechanisms through which spillovers occur, focus mainly on backward and forward linkages between firms (e.g. Smarzynska Javorcik, 2004; Aitken and Harrison, 1999). Also in these studies the evidence on productivity spillovers is mixed.

Labour mobility as a channel for spillovers has hardly been studied, but recently there has been increased interest in the subject. Employees could be a source of spillovers if they acquire superior knowledge at a foreign owned firm and bring this knowledge with them to benefit their new employer when they change jobs. Recent papers by Görg and Strobl (2005) and Balsvik (2006) study spillover effects through labour mobility in Ghana and Norway respectively. Both find positive productivity effects when employees move from multinational firms to domestic firms in the same industry[2].

If employees at foreign owned firms accumulate knowledge that purely domestic firms do not possess but deem to be valuable, domestic firms may have an incentive to pay

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[2] Görg and Strobl (2005) only consider employees who set up their own firm after leaving the multinational.

higher wages in order to attract these employees and obtain access to this knowledge. Higher earnings for employees with experience at a foreign owned firm would indicate that employees obtain a private return to knowledge accumulation or training in the foreign owned firm. If such a private return exists, models of human capital accumulation would imply that employees should pay for the opportunity to gain access to this knowledge, e.g. in the form of lower wages. Martins (2005) and Balsvik (2006) find that employees with experience in multinational firms earn higher wages than their co-workers. Whether or not employees pay for this knowledge has, to the best of our knowledge, not been studied.

The purpose of this paper is to study the mobility of employees between foreign and domestic firms and to examine whether employees are able to appropriate rents accruing to the potentially superior knowledge that foreign owned firms possess. Employees' wages prior to their transfer from a foreign to a domestic firm are studied to determine whether they are paying for this knowledge in the form of lower wages. Transfer of technological or managerial knowledge between firms may require a certain skill level of the employee changing firms, so this study distinguishes between mobility of employees with different educational backgrounds. Furthermore, spillovers from foreign to domestic firms can also be negative, which could be the case e.g. if FDI were technology sourcing[3]. To take into this into account, both mobility from foreign to domestic and from domestic to foreign firms are studied.

The analysis is based on linked employer-employee panel data from Statistics Finland. The extensive data set consists of information on Finnish firms and workers and covers the period 1994 - 2002. The estimates indicate that prior experience in a foreign owned firm has a positive effect on earnings for highly educated employees, over and above the effect of other previous experience. These employees do not appear to pay in the form of lower wages for the knowledge they accumulate at foreign owned firms. Robust evidence of an additional return to experience gained in domestic firms for workers moving to foreign firms is not found.

The remainder of the paper is structured as follows. Section 2 presents a brief overview of the related theoretical and empirical literature. Section 3 describes the data used in the

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[3] Driffield and Love (2003) study panel data on UK industries and find that such "reverse spillovers" exist. They do not, however, consider the mechanisms through which these spillovers arise.

analysis. Section 4 outlines the empirical specification and presents the estimation results. Finally, Section 5 concludes.

2 Related literature

2.1 Theoretical background

Spillovers occur when domestic firms benefit from knowledge diffusing from foreign firms, and the foreign firms are not able to capture the full return to their knowledge. If knowledge is transferred from foreign to domestic firms through labour mobility, the extent of the spillover or externality is defined by the division of the costs and benefits of knowledge accumulation between the foreign owned firm, its employees, and the firms these employees move to. In addition to recent models of spillovers through labour mobility between multinational and domestic firms (e.g. Fosfuri et al. 2001), this type of phenomenon can be thought of in the context of models of R&D spillovers and models of on-the-job training.

In the models of Fosfuri et al. (2001) and Glass and Saggi (2002) there is a trade-off between technological and pecuniary spillovers to the local economy, where the multinational firm can pay a worker a premium to prevent technology transfer. Fosfuri et al. (2001) analyse a model where the multinational firm can use a superior technology only after training a local worker. In their model, a worker who is trained by a multinational firm earns more than untrained workers if the multinational seeks to prevent technology transfer. The trained worker also appropriates some of the rents created by the technology when a local firm hires him to gain access to the technology. Fosfuri et al. show that in their model spillovers through mobility depend on the extent of product market competition and the transferability of the technology, which can be interpreted as depending on the absorptive capability of the local firm or the specificity of on-the-job training.

Glass and Saggi (2002) assume that workers employed by a multinational firm acquire knowledge of the superior technology instantaneously, i.e. not through training. Their objective is to determine whether wage premiums are paid purely to control technology diffusion. In Glass and Saggi's model workers receive a wage premium only when there is no technology transfer, i.e. when the multinational keeps its employees. In this model

spillovers depend on the level of diffusion (i.e. workers may only have knowledge of a portion of technology, or may be unable to fully utilize the knowledge), as well as the number of foreign and domestic firms in the market.

Models of R&D spillovers through worker mobility also provide a framework for thinking of spillovers from foreign owned to domestic firms. Pakes and Nitzan (1983) develop a model where scientists and their employers realize that the scientists will accumulate knowledge when conducting research and may get a return to this knowledge by moving to another firm. Therefore, labour contracts are designed to ensure a future wage increase, which leads scientists to accept an initial wage that is below their outside option. Franco and Filson (2006) model spillovers that occur when employees quit their job in order to start their own firm. Workers imitate their employer's technological know-how and then use this knowledge in their own firm. Franco and Filson show that the equilibrium in their model is Pareto optimal since employees pay for the chance to acquire their employer's knowledge.

In the context of on-the-job training models the specificity of training could be interpreted as the transferability of the knowledge acquired when working for the multinational, as in Fosfuri et al. (2001). For spillovers to occur, training would have to be of a general nature. The theoretical relationship between general training and earnings can vary depending on whether labour markets are viewed as perfectly or imperfectly competitive. In a perfectly competitive labour market, as in Becker's (1962) analysis, employees bear all the costs and reap all the benefits of general training[4]. If, however, labour markets are imperfectly competitive, this does not necessarily hold: workers may not be paid their marginal product and employers receive some of the benefits from general training (see e.g. Manning, 2003; Acemoglu and Pischke 1999).

Rosen (1972) develops a model where firms differ in terms of their on-the-job training opportunities. Workers pay for jobs with more learning opportunities in the form of lower wages and choose an optimal sequence of jobs taking into account that the possibility to capitalise returns on skills declines as retirement approaches. Rosen's model implies that workers bear the cost of training by accepting lower wages earlier in their career, and also that workers move to jobs with less learning opportunities as they age. Loewenstein and Spletzer (1998) consider a model where contract enforcement

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[4] The costs of training may be indirect in the form of lower wages while in training.

conditions cause employers to share the costs and returns to general training. Their model is consistent with evidence that employees do not seem to bear all the cost of general training, and that training paid by previous employers has a larger effect on earnings than training paid by the current employer. Balmaceda (2005) develops a model where firms pay for general training and workers receive the full return on it based on the model's properties of general and specific training being separable in the production function and wages being determined by the outside-option principle.

The models of human capital accumulation, such as the Rosen (1972) model, incorporate the possibility that formal schooling may influence learning capacity and thereby the incentives for knowledge accumulation. Schooling may also be a relevant factor in the actual transfer of knowledge from foreign to domestic firms due to the type of knowledge that is presumed to be transferred. The literature on knowledge spillovers between multinational and domestic firms discusses various forms of knowledge that may be transferred, e.g. technological, managerial or marketing knowledge (Bellak, 2004; Markusen, 1995). These forms of knowledge imply that knowledge transfer may require a certain skill level of the employee moving from a foreign to a domestic firm.

The theoretical models described above give rise to interesting hypotheses concerning the effects of knowledge accumulation in foreign owned firms on the earnings of workers who subsequently move to domestic firms. Firstly, if workers accumulate productivity enhancing transferable knowledge at the foreign owned firm, they would be expected to earn a return on this when moving to a domestic firm. This return will obviously depend on the extent to which wages are related to the marginal productivity of the worker. The potential for knowledge transfer and any subsequent private return to the employee may also be influenced by the educational background of the employee. To the extent that wages are related to the marginal productivity of the worker, returns to job mobility between foreign and domestic firms will also be indicative of productivity spillovers. With wage increases essentially having to be paid out of benefits from increased productivity, estimates of wage effects will provide a lower bound for potential productivity effects.

Secondly, if workers are able to earn such a return to the knowledge they accumulate, several of the models above imply that they should pay for this in the form of lower wages when they begin working at the foreign owned firm. Finally, the models above

assume that workers move from a firm with better possibilities for knowledge accumulation to firms where this knowledge is not available. If knowledge diffusion actually takes place from domestic to foreign firms, workers would be expected to benefit from mobility in this direction. The next section discusses previous empirical evidence related to these issues.

2.2 Previous empirical research

Empirical evidence on knowledge spillovers from foreign to domestic firms through worker mobility is scarce. Using data from Ghana, Görg and Strobl (2005) study productivity of firms run by owners who previously worked at multinational companies. As discussed above, they find positive productivity effects compared to domestic firms when workers established a company in the same industry as their previous employer. Balsvik (2006) studies Norwegian manufacturing firms, and finds that employees who move from multinational to purely domestically owned firms have a positive effect on total factor productivity. Employees with experience in multinational firms also earn higher wages than their co-workers, but the productivity effect of the increased share of workers with experience in multinational firms is larger than the effect that experience in multinational firms has on employees' wages.

Positive productivity spillovers could also imply that wages increase across the board in domestic firms, i.e. the wage effect is not restricted to the worker moving from a foreign owned to a domestic firm. Such an effect could also be observed without actual spillovers, if foreign firms pay higher wages on average and domestic firms competing in the same labour market have to pay higher wages to attract workers as a consequence of this. In a study using cross section data, Aitken et al. (1996) find evidence that the presence of foreign owned firms leads to positive wage spillovers to domestic firms in the US, but in Mexico and Venezuela such spillovers are not found. Lipsey and Sjöholm (2004) also use cross section data and find that a foreign presence in a sector has a positive effect on wages in domestic firms in that sector. Girma et al. (2001) use British panel data and find no effect of a foreign presence on wage levels in domestic firms. They do, however, find some evidence of a negative effect on wage growth.

Empirical evidence on R&D spillovers through labour mobility is provided by, among others, Almeida and Kogut (1999) who study the mobility of patent holders between firms. They find that labour mobility does influence the transfer of knowledge and that

the flow of knowledge seems to be embedded in regional labour networks. Møen (2005) studies R&D spillovers empirically in a human capital framework. He shows that workers pay for the possibility to accumulate knowledge in R&D intensive firms by accepting lower wages early in their career. The return to these implicit investments is obtained later on, when wage increases reflect the increased value of their knowledge. Møen points out that these results indicate that markets, to some extent, internalize the potential externalities created by labour mobility.

Considering experience accumulated at a foreign owned firm from the point of view of on-the-job training, relevant empirical research indicates that a large share of employer provided training is general and transferable (Loewenstein and Spletzer, 1999) and that employees do not directly nor indirectly pay for the training they receive (Lynch, 1992; Loewenstein and Spletzer, 1998; Barron et al., 1999). Loewenstein and Spletzer (1998) find, in addition, that completed spells of general training provided by a previous employer have a larger effect on earnings than completed spells of general training provided by the current employer.

The empirical evidence cited above indicates that labour mobility may be a channel for knowledge diffusion, and employees appear to benefit from the knowledge transfer process in terms of higher earnings. Evidence on knowledge diffusion from foreign owned to domestic firms and the extent to which employees are able to appropriate rents to this knowledge is, however, limited.

3   Data

This study uses a data set from Statistics Finland that links information on employers, i.e. firms and plants, and their employees[5]. The data set is a 1/3 sample of individuals that were 16 to 69 years old in 1990. They are followed to year 2002 and the sample is extended each year by adding a 1/3 sample of 16 year old persons. The sample size is approximately 1 million individuals annually. The data set contains extensive information on individuals' characteristics including details on education, family, labour market situation, income and so forth. The firm and plant level variables include information on industry, ownership, economic activity etc. Information on the employer

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[5] The data set is formed by linking data from various Statistics Finland databases: Finnish Longitudinal Employer-Employee Data, Business Register, Industrial Statistics, Financial Statements Statistics, R&D survey, ICT survey.

is linked to each individual based on the employer at the end of the year. Because of confidentiality, some of the firm level information is in the form of classified variables (e.g. size classes), ratios (e.g. productivity), growth rates (e.g. employment growth), plant averages (e.g. average age of employees), or binary variables (e.g. ownership status). These data are collected for all available years on all firms and plants that employ at least one individual in the sample. The plant and firm panels thus cover most of the business sector in Finland, almost 200 000 plants.

Information on foreign ownership is only available from 1994 onwards, which is not a severe restriction considering that foreign ownership in Finland was scarce before this time due to strict regulations that were not abolished until 1992 (Golup, 2003). This study uses the data from 1994 onwards because the focus is on issues related to foreign ownership. Foreign ownership is defined on the basis of ultimate beneficiary owner (UBO) and a 20 % threshold is used in classifying a plant as foreign owned. It has been suggested in the literature, that the focus should actually be on the comparison of multinational and non-multinational firms, rather than foreign owned and domestic firms (e.g. Bellak, 2004). Unfortunately, there is no reliable indicator of multinational status in the data set for this period, so the analysis will be based on comparing foreign owned and domestic owned firms.

In this study the sample is restricted to include only individuals who are employed at least six months every year from the time they are first included in the sample. This implies that the included individuals have a reasonably strong attachment to the labour market and may help to avoid confounding effects of elongated spells of non-employment with the effects of different types of work experience. The effects of experience in foreign owned firms on labour market outcomes other than earnings would, of course, be an interesting topic in itself but is beyond the scope of this paper. 95 percent of the included individuals are employed for 12 months every year, which roughly ensures that job moves are voluntary, as discussed in Manning (2003). Since the objective is to study mobility from foreign to domestic firms as a source of knowledge spillovers, voluntary job moves are the focus of attention.

To enable the analysis of mobility, workers who are only observed for less than three periods are excluded. In addition, because some of the control variables, such as industry, region and ownership are based on linking to plant data, I restrict the sample to include

only workers with an employer plant code every year that they are in the data. This basically restricts the sample to the private sector and is the major difference compared to the full data set. A lower bound of 500 euros for monthly wages is also imposed. Finally the data are checked for and cleared of observations with missing ownership indicators and discrepancies in other key variables. Following these amendments the sample consists of 146 700 individuals, of whom approximately 72% are observed in all nine years. These individuals work in 40 153 different plants. The total number of person-year observations in the restricted sample is 1158 789. Further details on the structure of the restricted vs. full data set are discussed in the appendix.

In this study a job is defined as an employee-plant match and job mobility is defined by combining information on the start date of employment and information on changes in an individual's plant and firm codes. This combination of information is used to ensure as accurate a measure of job mobility as possible and to avoid problems related to renewal of employment contracts with the same employer on the one hand and administrative changes in plant and firm codes on the other. Basically a worker is classified as having changed jobs if he/she has both changed plants and started a new employment contract during the year. In addition, this measure of job mobility is corrected so that if a worker's firm code does not change, i.e. if the worker moves from one plant to another in the same firm, he/she is not classified as a mover. Plant codes are used as the basis of identifying job mobility because they have been found to be more stable and less subject to administrative changes than firm codes in this data. The adjustment using information on continuous employment contracts and unchanged firm codes should minimize the classification of plant changes within the same company as job changes. Obviously a worker could have changed jobs several times during the year, but the data enables only the determination of the start date of the latest employment contract, and the plant and firm codes are based on the last week of the year.

Table 1 shows the number of employees in foreign and domestic plants annually. The steady rise in the share of employees working in foreign owned plants is consistent with the increase in foreign ownership following the abolition of restrictions on FDI (see Ilmakunnas and Maliranta, 2004). The mobility of employees between these plants is documented in Table 2. The majority of job changes occur between domestic owned plants. Mobility from foreign to domestic plants and especially from domestic to foreign

plants increases relatively more than the total number of job changes, which is in line with the increase in the employment share of foreign owned plants.

[Table 1 & Table 2 here]

The purpose of this paper is to study how experience in foreign owned firms affects earnings in subsequent jobs. It may of course be that workers who have experience from foreign owned firms and are consequently hired to work for domestic firms differ in terms of other characteristics that affect earnings. Tables 3 and 4 show statistics for employee characteristics by different types of work experience. It should be noted that the experience measured here is restricted to recent experience due to data availability. Therefore, individuals will have a positive amount of prior experience only if they have changed jobs after 1994. This also shows up as lower tenure for those who have prior experience from both foreign and domestic firms, since they will have changed jobs at least twice during this period. The average age is lower for those with prior experience, which, since only recent job moves are observed, is consistent with evidence that job mobility is more common among young workers. In addition, the share of women is slightly higher in the group with no prior experience, which implies that they may change jobs less frequently. Average earnings are higher for those with prior experience in a foreign owned firm, which is partly explained by different education levels: those with experience in foreign owned firms are also more educated.

[Table 3 & Table 4 here]

Table 5 documents changes in earnings following a job change. Employees seem to gain on average both from moving from a foreign to a domestic firm and from moving between domestic firms. The average wage gain is actually higher in relative terms for job changes between domestic firms, but the average real wage remains lower than that of employees who move from a foreign to a domestic firm.

[Table 5 here]

4   Estimation

To test the various hypotheses outlined in Section 2, we first estimate wage equations for workers in domestic firms, taking into account experience accumulated in foreign owned

firms and other domestic firms. This enables us to determine whether the return to previous experience in foreign owned firms differs from previous experience in purely domestic firms. Second, we consider also earnings of employees in foreign firms and examine whether employees' earnings development in foreign owned firms implies that they pay for the opportunity to gain access to foreign owned firms' knowledge. Third, when considering the earnings of employees in both domestic and foreign firms, we take into account mobility between these firms, and control for experience in different types of firms in order to test for "reverse spillovers", i.e. spillovers from domestic to foreign firms. Finally, the robustness of the results to the use of different specifications is also tested.

4.1 Empirical Specification

In order to examine the possibility that workers moving from foreign to domestic firms appropriate returns to knowledge acquired at the foreign firm, the earnings of employees in domestic firms are regressed on indicators of previous experience in general and previous experience in foreign owned firms, as well as a large set of control variables. The empirical specification to be used can be written as:

$$\ln w_{it} = X_{it}\beta_1 + \beta_2 prev + \beta_3 prev^2 + \beta_4 prev^3 + \beta_5 prevf + \beta_6 prevf^2 + \beta_7 prevf^3 + \mu_i + \gamma_t + \varepsilon_{it}, (1)$$

where $\ln w_{it}$ is the log real monthly wage, X_{it} includes personal characteristics and firm characteristics, μ_i is a person specific fixed effect and γ_t is a time effect. The variable *prev* measures accumulated years of experience at all previous employers and the variable *prevf* measures accumulated years of experience in foreign owned firms. Work experience prior to the period for which data is available (1994) can not be determined, but age and education are used to control for potential work experience. Other individual level control variables include gender and tenure. Plant level control variables include sales per employee, firm size, region and industry. In addition, an indicator is included for whether the firm that the individual worked for in the previous year reduced employment by 40% or more, and similarly for this period's employer. This aims to control for potentially involuntary job mobility.

To study the development of earnings for employees in foreign owned firms, and to check for evidence of reverse spillovers, the model described above is extended to

account for mobility between foreign and domestic firms in both directions and tenure in foreign firms. The extended version of the model can be written as:

$$\ln w_{it} = X_{it}\beta_1 + \beta_2 prev + \beta_3 prev^2 + \beta_4 prev^3 + \beta_5 prevdf + \beta_6 prevdf^2 + \beta_7 prevdf^3$$
$$+ \beta_8 prevfd + \beta_9 prevfd^2 + \beta_{10} prevfd^3 + \beta_{11} prevff + \beta_{12} prevff^2 + \beta_{13} prevff^3 \qquad (2)$$
$$+ \beta_{14} for + \beta_{15} for*tenure + \beta_{16} for*tenure^2 + \beta_{17} for*tenure^3 + \mu_i + \gamma_t + \varepsilon_{it}$$

Model (2) is otherwise similar to model (1), but there are additional variables measuring experience at previous employers interacted with the ownership of both the previous employer and the current employer. The experience variables measure 1) years of previous experience at domestic firms for individuals who move to a foreign firm (*prevdf*), 2) years of previous experience at foreign firms for individuals who move to a domestic firm (*prevfd*), and 3) years of previous experience at foreign firms for individuals who move to another foreign firm (*prevff*). The excluded experience category includes individuals with previous experience only in a domestic firm. A dummy for foreign ownership (*for*) is also included, as is its interaction with tenure.

Accumulated experience (both in domestic and foreign firms) may be correlated with individual characteristics that the employers are able to identify, but that are not available in the data. In addition, workers with experience from foreign owned firms may be different from workers with experience only in domestic firms e.g. if foreign firms have a more efficient screening process for new recruits. As the data set is a panel, the estimation can be done using individual fixed effects to control for these unobserved characteristics. As discussed in Section 2, knowledge transfer may predominantly be related to mobility of the more educated. Therefore, model (1) is also estimated with interaction terms between university education and different types of experience.

Various robustness checks are done to check that the chosen functional form and the experience measure used are not driving the results. Details are in the next section. To take into account the fact that the data set is a panel and observations for a given individual in consecutive years are unlikely to be independent, we use robust standard errors that allow for correlation among observations for an individual in different years.

4.2 Estimation results

4.2.1 Mobility from foreign to domestic firms

Table 6 presents estimates of the effect that previous experience in foreign owned firms has on earnings for employees in domestic firms. The first column shows the results of an OLS regression of model (1) above. The coefficient on previous experience indicates that experience accumulated at previous employers has a positive and significant effect on earnings. This is consistent with human capital models. The variable of interest is, however, the interaction between the nationality of previous employers and years of experience at previous employers. The effect of previous experience at a foreign owned firm is positive and significant, indicating that there is an additional gain to having worked at a foreign owned firm. As noted above, there may be unobserved characteristics that are correlated with the measure of accumulated experience. To eliminate the unobserved effects, model (1) is estimated using individual fixed effects. The results of this estimation are presented in column (2) of Table 6. The coefficients on both total previous experience (as measured from 1994 onwards) and previous experience at foreign owned firms are actually higher when using fixed effects than using OLS. These results imply that workers do get returns to knowledge accumulated at foreign establishments when moving to a domestic firm. The findings are consistent with the models above that imply that mobility may be a way of appropriating returns to accumulated knowledge, and also with empirical evidence from Norway (Balsvik, 2006).

[Table 6 here]

It was argued above that if there are knowledge spillovers from foreign owned to domestic firms through worker mobility, they may be predominantly the result of educated workers changing firms. Columns (3) and (4) of Table 6 report OLS and fixed effect estimates respectively for model (1) including interactions of the experience variables with a dummy indicating whether an individual has a university degree. The estimates imply that the positive effect that previous experience in a foreign owned firm has on earnings is driven by the effect on the earnings of the highly educated. Previous experience in general still has a positive effect on earnings, and this effect is more pronounced for the university educated. However, previous experience in a foreign firm only increases the earnings of workers with a university degree, and the effect is substantial. There thus appears to be something of additional value in the experience that

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educated employees gain at foreign owned firms, for which domestic firms are willing to pay up. The finding that it is the university educated individuals who appear to benefit from knowledge accumulation at foreign owned firms is consistent with the prediction that the type of knowledge being transferred requires a certain skill level.

4.2.2 Mobility between foreign and domestic firms and the cost of knowledge accumulation

If employees are able to reap returns to the knowledge they accumulate in foreign owned firms, the models of R&D spillovers and on-the-job training mentioned above imply that they should pay up for the opportunity to gain access to this knowledge. To try to identify this effect, model (2) is estimated for workers in both domestic and foreign firms. As mentioned above, this extended model also allows us to study potential knowledge diffusion from domestic to foreign firms.

The results for the estimation of model (2) are presented in Table 7. The model is again estimated with OLS for comparison; the results are in column (1). The focus is on the fixed effects estimates in column (2), due to the potential bias caused in OLS by unobserved characteristics. The results in column (2) show that the additional positive wage effect found earlier for individuals with experience in foreign firms, who move to domestic firms, is consistently present in these results. There is also a positive but smaller wage effect for workers who have experience in domestic firms and move to a foreign firm. Workers who have experience in foreign firms and move to another foreign firm also gain from this experience, with a coefficient similar to that of workers with experience in foreign firms who move to a domestic firm. This result is in line with the Loewenstein and Spletzer (1998) model, where employees do not realize the full return to training until they change jobs. In the context of the models of knowledge transfer, these findings suggest that there is knowledge diffusion taking place through labour mobility in all directions, but that the experience from foreign owned firms is more highly valued. However, we next take into account the educational background of the employees who change jobs, and find that these results are altered.

Columns (3) and (4) of Table 7 show results for estimation of the same OLS and fixed effects models respectively, but including interactions between the experience variables and a dummy for having completed a university degree. Here again previous experience in general has a positive and significant effect on earnings, and the effect is stronger for

the university educated (as seen in the second part of Table 7). However, focusing on the fixed effects estimates in column (4), only experience in a foreign owned firm for workers in domestic firms has an additional statistically significant effect and this is only true for the highly educated. This would imply that there is something different about mobility of educated workers from foreign to domestic firms, compared to other types of mobility. This finding is interesting in various respects. Firstly, as noted above, this type of result is consistent with the view that knowledge transfer depends on the skill level of the employee. Secondly, the fact that it is mobility from foreign to domestic firms and not in the opposite direction that appears to be beneficial in terms of earnings, implies that potential knowledge transfer by educated employees is taking place from foreign to domestic firms and not vice versa. This is consistent with evidence that foreign owned firms outperform purely domestic firms (e.g. Bellak, 2004; Ilmakunnas and Maliranta, 2004).

[Table 7 here]

An additional aspect of interest in the estimation of model (2) is the foreign ownership effect. The models outlined in Section 2 imply that if workers gain in terms of earnings from experience in a foreign owned firm, this should show up in the form of lower wages while working (or starting to work) for the foreign firm. Looking at the fixed effects results in column (2) of Table 7, the foreign ownership dummy actually has a small negative coefficient, implying that workers may accept lower wages in exchange for the learning possibilities in a foreign owned firm. On the other hand, the interaction of the foreign ownership dummy with tenure has a small positive coefficient, which indicates that workers earn a return to experience at the foreign owned firm already when working there.

When adding the interactions of previous experience with the dummy for university education, it would appear that these results differ depending on the education level of the individual. Focusing on the fixed effects estimates in column (4) of Table 7, the foreign ownership effect is no longer significant and the ownership dummy interacted with tenure in the foreign firm is actually slightly negative on average, but positive for the highly educated. This implies that earnings on average grow more slowly in foreign than in domestic firms. This could be due to e.g. differences in the division of returns to accumulated knowledge. For the university educated, however, earnings increase more

rapidly with tenure in foreign firms than in domestic firms. This indicates that in addition to a return to prior experience in foreign owned firms, educated workers also appear to earn a return to the knowledge they have accumulated already when working at the foreign owned firm.

In the traditional human capital framework the additional return that educated workers receive could be interpreted as the return to some form of human capital that these workers in foreign owned firms accumulate and workers in domestic firms do not. On the other hand, in the context of the models of Fosfuri et al. (2001) and Glass and Saggi (2002), this could be interpreted as evidence of educated workers being paid a premium to prevent knowledge transfer. The positive effect of tenure in a foreign firm seems on average smaller than the return that these workers earn once they leave the foreign firm for a domestic firm or another foreign firm, which would be in line with Loewenstein and Spletzer's (1998) model where employers extract some of the return to general training. The small foreign ownership effect is consistent with recent evidence that the foreign ownership wage premium often found in studies may be due to poor data and methods (e.g. Martins, 2006 and Heyman et al., 2004.). Proper estimation of this effect would require further refinements here as well.

4.2.3 Robustness checks

This section analyses the robustness of the results presented above to the use of different specifications and discusses the potential problem of endogenous job mobility. First, in order to examine the effect of the choice of experience measure and functional form of the empirical specification on the results, we consider alternatives for both[6]. The first modification uses an experience measure incorporating both previous experience and current tenure, i.e. tenure is included both in the experience variable and as a separate regressor. This commonly used form of the wage regression yields results consistent with those above. Next, to take into account the fact that the distribution of previous experience is restricted by experience only being measured from 1994 onwards, the extended version of the model was also estimated from 1998 onwards using experience data starting in 1994. The results are consistent with those described above. In addition, to further check the robustness of the results with respect to the experience measure and specification being used, the estimations were done from 1997 onwards using dummy variables indicating years of prior experience in a foreign firm during the three years

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[6] Results not shown, available on request.

immediately preceding each observation year[7]. These results are also consistent with the results above.

The results from the estimation of both models (1) and (2) indicate that employees may accumulate knowledge that is not available in domestic firms when working at a foreign firm and be able to appropriate some of the return on this knowledge when moving to a domestic firm. There may, however, be some process whereby job mobility in itself is a way of achieving higher earnings, as detailed in the job mobility literature (e.g. Manning, 2003). This may be one explanation behind the positive wage effects for all types of prior experience documented above. It is important to note that prior experience may be endogenous in the earnings equation, precisely because the potential for achieving a higher wage is likely to be one of the determinants of job mobility. To control for this, we would need an instrument for having changed jobs, and this is unfortunately currently unavailable[8].

In order to try to correct for the possible endogeneity we do, however, estimate model (1) using data on individuals who either stay at their job during the whole observation period or move to a new job only in connection with a significant (greater than or equal to 40%) reduction in their employer plant's labour force. So the "stayers" work in a domestic firm continuously, and the "movers" leave either a foreign or domestic firm for a new job at a domestic firm. Significant employment reduction is one of the definitions of displacement used in the literature (e.g. Bender et al., 2002) and is designed to include those individuals who leave the firm because they foresee the plant closure or are dismissed as the firm downsizes prior to closure. The measure may, however, also include employees who leave the firm for other reasons and is obviously far from perfect.

The sample is extended to include employees who are employed for at least one month in each year, as opposed to the minimum of six months above. In order to be able to match the employees to a plant, all the included individuals are employed at the end of the year. As the primary question of interest here is the effect of experience in a foreign owned firm on subsequent wages, the sample is restricted to workers who find a new job rapidly after leaving their old job, and the effects on the length of unemployment etc. are not

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[7] I.e. an individual is indicated as having either 0, between 0 and 1, between 1 and 2, or between 2 and 3 years of previous experience. This assumes that only very recent experience is relevant.
[8] This is a constant problem in the research on job mobility and most authors have been unable to find a satisfactory solution.

studied. This is an area for further research. The sample to be used in estimation includes over 700 000 workers who do not change jobs and 4048 workers who change jobs in connection with decreasing employment at their plant. 389 of the workers who change jobs leave a foreign firm. As in model (1) above, the earnings of employees in domestic firms are studied, taking into account experience in both domestic and foreign firms.

The results are shown in Table 8, where column (1) displays the OLS estimates and column (2) the estimates including fixed individual effects. Previous experience is again a measure of work experience prior to moving to the current job (from 1994 onwards), and in this data is greater than zero only for workers who have left their job in connection with plant downsizing. Even for this group of workers, previous experience has a positive and significant effect on earnings, although the fixed effects estimates are somewhat lower than in the basic estimation above. The effect of experience in a foreign owned firm is not significant. Columns (3) and (4) of Table 8 show results of OLS and fixed effects estimations respectively including interaction terms between the experience variables and a dummy for having obtained a university degree. Also for these workers a university degree implies an additional positive effect of previous experience on earnings and in addition a marginally significant positive effect of experience in foreign owned firms. The low number of individuals who change jobs may affect the precision of the results, but these findings indicate that the positive effect of previous experience observed in our earlier estimations is not purely due to endogenous job mobility, and there appear to be some returns to accumulated knowledge that are not realised until changing jobs.

5 Conclusions

The purpose of this study was to ascertain whether workers are able to appropriate rents to the potentially superior knowledge possessed by foreign owned firms when moving to a domestic firm. The analysis shows that prior experience in foreign owned firms has a positive effect on earnings of the university educated, over and above the effect of other previous experience. These findings are consistent with models of knowledge diffusion through labour mobility, where a domestic firm may bid for a worker at a foreign owned firm in order to gain access to her knowledge. The results indicate that these workers do not pay in the form of lower wages for the knowledge they accumulate at foreign owned firms, and although their earnings grow faster in foreign firms than in domestic firms, the return to the accumulated knowledge increases when the worker changes jobs. These

findings are in line with on-the-job training models where employers pay for and are able to extract some of the return to general training. Further research on the development of employees' productivity both during and after working for a foreign firm is needed in order to assess how the returns to the potentially superior knowledge in foreign owned firms are actually distributed.

An important issue to be dealt with in further research is the problem of potentially endogenous job mobility. When attempting to control for this by studying the earnings of workers who leave their job in a time of significant employment reduction, the results indicate that workers do earn a return to knowledge accumulated at previous jobs even when they change jobs involuntarily. The additional positive effect of experience in a foreign owned firm for the university educated is, however, only marginally significant, which may be due to the restricted sample used in the analysis. If employees with experience at foreign owned firms have accumulated valuable knowledge, this may also show up in other labour market outcomes, e.g. employment probabilities. Studying these effects is therefore a natural extension of the current study.

Appendix

Data description

In order to see how the modified sample used for estimation compares to the structure of the labour force in general, Table A1 shows descriptive statistics for the individuals in the whole data set (from 1994 onwards) and the restricted data set. The full data set has 10 879 318 person year observations, whereas the restricted data set has a total of 1 158 789 person-year observations. As would be expected from the way the restricted data set is formed, average tenure is higher than in the sample of the total labour force. In addition, the share of females in the estimation data set is lower, with a third of the observations being on female workers, as opposed to half in the full data set. This also seems reasonable if men have a stronger attachment to the labour market than women, which probably is the case e.g. due to women taking maternity leave. The average monthly wage is higher in the restricted data set, which would also be expected if individuals in this data set have longer tenure and a stronger attachment to the labour market. Another factor that is likely to contribute to the higher average earnings in the restricted sample is that the share of workers with less than secondary education is materially higher in the full data set, as shown in Table A2.

Table A1 Individuals 1994 to 2002

Variable	Whole data set			Restricted data set		
	N	Mean	Std.Dev.	N	Mean	Std.Dev.
Age	10 879 318	42.10	15.04	1 158 789	40.41	9.94
Female	10 870 887	0.50	0.50	1 158 782	0.33	0.47
Tenure (months)	5 823 990	84.32	105.47	1 153 837	141.67	113.57
Real monthly wage (2002 euros)	3 056 004	2212	1903	1 157 694	2458	1208

Table A2 Individuals 1994 to 2002

Education	Whole data set		Restricted data set	
	Frequency	Percent	Frequency	Percent
Comprehensive school	3 968 983	36.48	301 767	26.04
Secondary education	4 239 147	38.97	518 938	44.78
Bachelor's degree	2 008 194	18.46	272 988	23.56
Master's or PhD	662 994	6.09	65 096	5.62
Total	10 879 318	100	1 158 789	100

Tables A3 and A4 compare the plants in the restricted data set to plants in the full data set. The full data set covers most of the plants in the business sector. The majority of plants in the business sector employ under 5 workers, whereas in the estimation data set the share of small plants is much lower. However, even in the restricted data set almost 60% of plants employ fewer than 10 workers. Average sales per employee are slightly higher in the estimation data set and the share of foreign owned plants is also somewhat higher.

Table A3 Plants 1994 to 2002

Variable	Whole data set			Restricted data set		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Sales/employee	1 048 126	140 415	905 563	152 074	161 773	697 154
Foreign	1 052 342	0.039	0.193	152 091	0.053	0.224

Table A4 Plants 1994 to 2002

Firm size	Whole data set		Restricted data set	
	Frequency	Percent	Frequency	Percent
0-4	647 180	61.5	59 133	38.88
5-9	117 529	11.17	31 071	20.43
10-19	72 098	6.85	18 788	12.35
20-49	55 133	5.24	10 849	7.13
50-99	25 405	2.41	4 586	3.02
100-299	34 640	3.29	6 777	4.46
300-	100 357	9.54	20 884	13.73
Total	1 052 342	100	152 088	100

References

Acemoglu, D. and Pischke, J.-S., 1999. Beyond Becker: Training in Imperfect Labour Markets, Economic Journal 109, F112-F142.

Aitken, B. and Harrison, A., 1999. Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. American Economic Review 89, 605-618.

Aitken, B., Harrison, A. and Lipsey, R.E., 1996. Wages and foreign ownership: a comparative study of Mexico, Venezuela, and the United States, Journal of International Economics 40, 345-371.

Almeida, P. and Kogut, B., 1999. Localization of Knowledge and the Mobility of Engineers in Regional Networks. Management Science 45, 905-917.

Balsvik, R., 2006. Is mobility of labour a channel for spillovers from multinationals to local domestic firms? Manuscript, Norwegian School of Economics and Business Administration.

Barba Navaretti, G. and A. J. Venables, 2004. Multinational Firms in the World Economy. Princeton University Press, Princeton.

Barron, J.M., Berger, M.C., and Black, D.A., 1999. Do Workers Pay for On-The-Job Training, Journal of Human Resources 34, 235-252.

Becker, G.S., 1962. Investment in Human Capital: A Theoretical Analysis, Journal of Political Economy 70, 9-49.

Bellak, C., 2004. How Domestic and Foreign Firms Differ and Why Does It Matter?, Journal of Economic Surveys 18, 483-514.

Bender, S., Dustmann, C., Margolis, D. and Meghir, C., 2002. Worker Displacement in France and Germany, in: P.J Kuhn, ed., Losing Work Moving On: International Perspectives on Worker Displacement. W.E. Upjohn Institute for Employment Research, Michicgan. 375-470.

Blomström, M. and A. Kokko, 1998. Multinational Corporations and Spillovers. Journal of Economic Surveys 12, 247-277.

Driffield, N. and J.H. Love, 2003. Foreign direct investment, technology sourcing and reverse spillovers. The Manchester School 71, 659-672.

Fosfuri, A., Motta, M. and Rönde, T., 2001. Foreign Direct Investment and Spillovers through Workers' Mobility. Journal of International Economics 53, 205-222.

Franco, A.M. and Filson, D., 2006. Spin-outs: Knowledge Diffusion through Employee Mobility, Rand Journal of Economics, forthcoming.

Girma, S., Greenaway, D. and Wakelin, K., 2001. Who Benefits from Foreign Direct Investment in the UK?, Scottish Journal of Political Economy 48, 119-133.

Glass, A.J. and Saggi K., 2002. Multinational firms and technology transfer, Scandinavian Journal of Economics 104, 495-513.

Golup, S. S., 2003. Measures of restrictions on inward foreign direct investment for OECD countries. OECD Economics Department Working Papers No. 357.

Görg, H. and Strobl, E., 2005. Spillovers from Foreign Firms Through Worker Mobility: An Empirical Investigation. Scandinavian Journal of Economics 107, 693-710.

Heyman, F., Sjöholm, F., and Gustavsson Tingvall, P., 2004. Is There Really a Foreign Ownership Wage Premium? Evidence from Matched Employer-Employee Data. Globalisation and Labour Markets Research Paper Series, University of Nottingham, 2004/39.

Ilmakunnas, P. and Maliranta, M., 2004. Foreign medicine: A treatment effect analysis of the productivity effects of foreign ownership, Applied Economics Quarterly (Konjunkturpolitik), Special Issue: Effects of Foreign Acquisitions on the Target Firms: Empirical Evidence from EU Countries 50, 41-60.

Lipsey, R.E. and Sjöholm, F., 2004, FDI and wage spillovers in Indonesian manufacturing, Review of World Economics / Weltwirtschaftliches Archiv 134, 321-332.

Loewenstein, M. A. and Spletzer, J.M., 1998. Dividing the Costs and Returns to General Training, Journal of Labour Economics 16, 142-171.

Loewenstein, M.A., and Spletzer, J.M., 1999. General and Specific Training: Evidence and Implications, Journal of Human Resources 34, 710-733.

Lynch, L., 1992. Private-Sector Training and the Earnings of Young Workers, American Economic Review 82, 299-312.

Manning, A., 2003. Monopsony in Motion: Imperfect Competition in Labour Markets. Princeton University Press, Princeton.

Markusen, J.R., 1995. The boundaries of multinational enterprises and the theory of international trade. Journal of Economic Perspectives 9, 169-189.

Martins, P.S., 2005. Inter-Firm Employee Mobility, Displacement, and Foreign Direct Investment Spillovers. Manuscript, Queen Mary, University of London.

Martins, P.S., 2006. Do Foreign Firms Really Pay Higher Wages? Evidence from Different Estimators. IZA Bonn, Discussion Paper No. 1388.

Møen, J., 2005. Is Mobility of Technical Personnel a Source of R&D Spillovers?, Journal of Labor Economics 23, 81-114.

Pakes, A. and Nitzan, S., 1983. Optimum contracts for research personnel, research employment, and the establishment of "rival" enterprises. Journal of Labor Economics 1, 345-365.

Rosen, S., 1972. Learning and Experience in the Labor Market. The Journal of Human Resources 7, 326-342.

Smarzysnka Javorcik, B., 2004. Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages. The American Economic Review 94, 605-627.

Tables

Table 1 Employees by firm ownership

	Domestic	% of all plants	Foreign	% of all plants	Total
1994	96 423	92 %	8 946	8 %	105 369
1995	100 309	91 %	9 857	9 %	110 166
1996	103 251	90 %	12 023	10 %	115 274
1997	107 786	89 %	13 975	11 %	121 761
1998	111 257	86 %	17 979	14 %	129 236
1999	115 460	84 %	21 423	16 %	136 883
2000	122 287	83 %	24 413	17 %	146 700
2001	121 663	83 %	25 037	17 %	146 700
2002	119 141	81 %	27 559	19 %	146 700
Total	997 577	86 %	161 212	14 %	1 158 789

Table 2 Number of job changes by firm ownership

	From domestic to domestic	From domestic to foreign	From foreign to domestic	From foreign to foreign
1995	5432	271	188	70
1996	2058	279	208	86
1997	2647	378	285	134
1998	3445	608	400	157
1999	3803	597	592	239
2000	3787	634	599	262
2001	4227	706	609	262
2002	2667	353	396	145
Total	28066	3826	3277	1355

Table 3 Characteristics of employees in domestic firms by type of recent work experience

Variable	Prior experience in for. & dom. firm			Prior experience in foreign firm only		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	5 098	36.27	8.40	6 471	35.58	9.16
Tenure (months)	5 024	19.49	16.38	6 411	26.17	21.63
Prior experience in domestic firm (years)	5 098	2.48	1.47	0		
Prior experience in foreign firm (years)	5 098	2.04	1.26	6 471	2.65	1.71
Female	5 098	0.31	0.46	6 471	0.29	0.46
Real monthly earnings (2002 euros)	5 085	3017	1623	6 439	2977	1623

	Prior experience in domestic firm only			No prior experience		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Age	104 628	37.65	9.63	881 380	40.71	9.92
Tenure (months)	103 594	32.66	31.42	878 252	154.21	112.40
Prior experience in domestic firm (years)	104 628	2.31	1.69	0		
Prior experience in foreign firm (years)	0			0		
Female	104 628	0.25	0.43	881 374	0.35	0.48
Real monthly earnings (2002 euros)	104 522	2503	1174	880 592	2380	1148

Table 4 Education of employees in domestic firms by type of recent work experience

Education	Prior experience in for. & dom. firm		Prior experience in foreign firm only	
	Freq.	Percent	Freq.	Percent
Comprehensive school	575	11.28	684	10.57
Secondary education	1 862	36.52	2 395	37.01
Bachelor's degree	1 943	38.11	2 237	34.57
Master's or PhD	718	14.08	1 155	17.85
Total	5 098	100	6 471	100

Education	Prior experience in domestic firm only		No prior experience	
	Freq.	Percent	Freq.	Percent
Comprehensive school	23 751	22.7	241 421	27.39
Secondary education	49 493	47.3	397 102	45.05
Bachelor's degree	24 484	23.4	198 932	22.57
Master's or PhD	6 900	6.59	43 925	4.98
Total	104 628	100	881 380	100

Table 5 Wage changes following job change

Variable	From domestic to domestic firm			From foreign to domestic firm		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Real monthly earnings before (2002 euros)	28 050	2 060	1 114	3 269	2 734	1 827
Real monthly earnings after (2002 euros)	28 050	2 460	1 329	3 269	2 860	1 695
Change in real monthly earnings (2002 euros)	28 050	0.27	0.49	3 269	0.13	0.44

Table 6 Wage effects of experience at a foreign owned firm

	(1)	(2)	(3)	(4)
Tenure	0.234	0.297	0.233	0.297
	(40.98)**	(72.19)**	(40.91)**	(72.44)**
Tenure^2	-0.09	-0.088	-0.09	-0.088
	(25.13)**	(36.31)**	(24.99)**	(36.49)**
Tenure^3	0.013	0.011	0.013	0.011
	(19.07)**	(25.35)**	(18.92)**	(25.48)**
Age	0.369		0.377	
	(12.38)**		(12.65)**	
Age^2	-0.038		-0.04	
	(4.92)**		(5.21)**	
Age^3	0.000		0.000	
	(0.01)		(0.31)	
Previous experience	0.057	0.119	0.072	0.087
	(15.85)**	(28.07)**	(18.09)**	(17.26)**
(Previous experience)^2	-0.009	-0.021	-0.015	-0.014
	(5.87)**	(13.44)**	(9.46)**	(7.14)**
(Previous experience)^3	0.001	0.001	0.001	0.001
	(3.99)**	(8.59)**	(7.29)**	(4.05)**
Previous experience, foreign	0.031	0.052	0.015	-0.049
	(2.86)**	(2.29)*	(1.03)	(1.67)
(Previous experience, foreign)^2	-0.003	-0.009	-0.001	0.039
	(0.57)	(0.69)	(0.12)	(2.24)*
(Previous experience, foreign)^3	0.000	0.001	0.000	-0.006
	(0.52)	(0.48)	(0.22)	(2.28)*
University*Previous experience			-0.047	0.096
			(6.15)**	(10.46)**
University*(Previous experience)^2			0.020	-0.026
			(6.31)**	(7.35)**
University*(Previous experience)^3			-0.002	0.002
			(5.38)**	(6.10)**
University*Previous experience, foreign			0.041	0.173
			(1.88)	(3.90)**
University*(Previous experience, foreign)^2			-0.010	-0.085
			(1.03)	(3.20)**
University*(Previous experience, foreign)^3			0.001	0.011
			(0.84)	(2.99)**
Fixed effects	No	Yes	No	Yes
Observations	844393	844393	844393	844393
R-squared	0.48	0.19	0.48	0.19
Number of individuals		135360		135360

Notes

1. The dependent variable is log real monthly earnings

2. Tenure and age are in years and divided by 10. Previous experience is in years.

3. Coefficients on the following variables are not reported: time dummies, regional dummies, industry dummies, education dummies (models 1 and 3), gender dummy (models 1 and 3), dummy for decreasing firm employment, firm size, sales/employee.

4. Robust t statistics in parentheses: * significant at 5%; ** significant at 1%

Table 7 Wage effects of experience in different types of firms

	(1)	(2)	(3)	(4)
Foreign	0.005	-0.005	0.005	-0.003
	(1.42)	(2.50)*	(1.45)	(1.34)
Foreign* Tenure	0.016	0.005	0.017	-0.009
	(5.06)**	(2.62)**	(5.44)**	(4.82)**
Foreign*Tenure^2	-0.001	0.000	-0.003	0.002
	(1.69)	(0.71)	(4.08)**	(4.33)**
Foreign*Tenure^3	0.000	0.000	0.000	0.000
	(1.23)	(2.88)**	(3.83)**	(5.46)**
Previous experience	0.061	0.115	0.076	0.082
	(17.33)**	(29.65)**	(19.22)**	(17.21)**
(Previous experience)^2	-0.01	-0.02	-0.017	-0.011
	(7.32)**	(13.58)**	(10.57)**	(6.36)**
(Previous experience)^3	0.001	0.001	0.001	0.001
	(5.36)**	(8.40)**	(8.34)**	(3.10)**
Previous experience, dom. to for.	-0.002	0.022	-0.009	0.018
	(0.16)	(2.75)**	(0.71)	(1.81)
(Previous experience, dom. to for.)^2	0.001	-0.003	0.003	-0.002
	(0.34)	(0.91)	(0.64)	(0.54)
(Previous experience, dom. to for.)^3	0.000	0.000	0.000	0.000
	(0.31)	(0.28)	-0.56	(0.14)
Previous experience, for. to dom.	0.030	0.041	0.015	-0.011
	(2.74)**	(3.97)**	(1.02)	(0.76)
(Previous experience, for. to dom.)^2	-0.002	-0.011	-0.001	0.003
	(0.48)	(2.56)*	(0.11)	(0.44)
(Previous experience, for. to dom.)^3	0.000	0.001	0.000	0.000
	(0.42)	(2.02)*	(0.19)	(0.16)
Previous experience, for. to for.	0.110	0.045	0.051	0.015
	(5.78)**	(3.65)**	(2.03)*	(0.79)
(Previous experience, for. to for.)^2	-0.025	-0.01	-0.002	-0.003
	(2.99)**	(1.84)	(0.15)	(0.36)
(Previous experience, for. to for.)^3	0.002	0.001	0.000	0.000
	(2.42)*	(1.37)	(0.31)	(0.23)

Table 7 Continued

	(1)	(2)	(3)	(4)
University*Foreign			0.001	0.004
			(0.13)	(0.89)
University*Foreign* Tenure			-0.004	0.037
			(0.56)	(9.78)**
University*Foreign*Tenure^2			0.005	-0.005
			(2.97)**	(5.10)**
University*Foreign*Tenure^3			0.000	0.000
			(3.24)**	(4.11)**
University*Previous experience			-0.044	0.093
			(5.93)**	(11.43)**
University*(Previous experience)^2			0.019	-0.025
			(6.25)**	(8.13)**
University*(Previous experience)^3			-0.002	0.002
			(5.42)**	(6.90)**
University*Previous experience, dom. to for.			0.019	-0.014
			(0.94)	(0.91)
University*(Previous experience, dom. to for.)^2			-0.007	0.002
			(0.85)	(0.32)
University*(Previous experience, dom. to for.)^3			0.001	0.000
			(0.80)	(0.16)
University*Previous experience, for. to dom.			0.04	0.081
			(1.85)	(3.88)**
University*(Previous experience, for. to dom.)^2			-0.010	-0.021
			(0.99)	(2.38)*
University*(Previous experience, for. to dom.)^3			0.001	0.002
			(0.81)	(1.65)
University*Previous experience, for. to for.			0.099	0.025
			(2.74)**	(1.01)
University*(Previous experience, for. to for.)^2			-0.043	-0.005
			(2.64)**	(0.44)
University*(Previous experience, for. to for.)^3			0.005	0.000
			(2.77)**	(0.40)
Fixed effects	No	Yes	No	Yes
Observations	989693	989693	989693	989693
R-squared	0.48	0.19	0.48	0.2
Number of individuals		146643		146643

Notes

1. The dependent variable is log real monthly earnings

2. Tenure and previous experience are in years.

3. Coefficients on the following variables are not reported: tenure, age (models 1 and 3), education dummies (models 1 and 3), gender dummy (models 1 and 3), time dummies, regional dummies, industry dummies, dummy for decreasing firm employment, firm size, sales/employee.

4. Robust t statistics in parentheses: * significant at 5%; ** significant at 1%

Table 8 Wage effects of experience gained prior to displacement

	(1)	(2)	(3)	(4)
Tenure	0.237	0.317	0.237	0.317
	(36.30)**	(67.02)**	(36.30)**	(67.06)**
Tenure^2	-0.089	-0.087	-0.089	-0.087
	(22.02)**	(32.00)**	(22.03)**	(32.05)**
Tenure^3	0.012	0.01	0.012	0.01
	(16.55)**	(22.45)**	(16.54)**	(22.49)**
Age	0.231		0.231	
	(6.83)**		(6.81)**	
Age^2	-0.01		-0.01	
	-1.2		-1.18	
Age^3	-0.002		-0.002	
	(2.47)*		(2.49)*	
Previous experience	0.068	0.155	0.059	0.113
	(5.09)**	(10.05)**	(3.95)**	(6.36)**
(Previous experience)^2	-0.019	-0.037	-0.016	-0.022
	(3.29)**	(6.10)**	(2.51)*	(3.28)**
(Previous experience)^3	0.002	0.003	0.001	0.001
	(3.06)**	(4.63)**	(2.42)*	(2.12)*
Previous experience, foreign	-0.011	-0.038	-0.02	-0.073
	(0.24)	(0.47)	(0.35)	(0.83)
(Previous experience, foreign)^2	0.016	0.04	0.016	0.068
	(0.71)	(0.67)	(0.55)	(1.12)
(Previous experience, foreign)^3	-0.002	-0.006	-0.002	-0.01
	(0.80)	(0.58)	(0.64)	(1.11)
University*Previous experience			0.027	0.152
			(0.86)	(4.12)**
University*(Previous experience)^2			-0.009	-0.056
			(0.70)	(3.71)**
University*(Previous experience)^3			0.001	0.005
			(0.60)	(3.62)**
University*Previous experience, foreign			0.066	0.294
			(0.61)	(1.79)
University*(Previous experience, foreign)^2			-0.028	-0.259
			(0.55)	(1.82)
University*(Previous experience, foreign)^3			0.004	0.047
			(0.68)	(1.84)
Fixed effects	No	Yes	No	Yes
Observations	709338	709338	709338	709338
R-squared	0.48	0.19	0.48	0.19
Number of individuals		110581		110581

Notes

1. The dependent variable is log real monthly earnings

2. Tenure and age are in years and divided by 10. Previous experience is in years.

3. Coefficients on the following variables are not reported: time dummies, regional dummies, industry dummies, education dummies (models 1 and 3), gender dummy (models 1 and 3), dummy for decreasing firm employment, firm size, sales/employee.

4. Robust t statistics in parentheses: * significant at 5%; ** significant at 1%